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Insulating tape for wrapping an electrical conductor

5 The invention relates to an insulating tape for wrapping an
electrical conductor with a fabric which is used as the supporting
body with warp threads which are routed in the direction of
winding, consisting of a first yarn, and with woof threads of a
second yarn which is finer than the first yarn and with a
dielectrically high quality material which is applied to a fabric.
10 One such tape is wound around an electrical conductor to insulate
the winding of an electrical machine, then impregnated under a
vacuum and pressure with an impregnation resin and afterward cured
as it is supplied to a tank.

Prior Art

15 An insulating tape as claimed in the preamble of claim 1 can be
taken for example from DE 38 24 254 A and EP 0 194 974 B. This
insulating tape contains a mechanically fixed supporting body of
glass silk fabric with a weight per unit area of typically 20 to 40
20 g/cm² and a layer of dielectrically high quality material which is
applied to this fabric, for example fine mica or mica paper, with
a weight per unit area which is a multiple of the weight per unit
area of the fabric. The proportion by weight of the dielectrically
high quality material determines the quality, especially the
25 breakdown strength, of insulation produced from the insulating
tape.

30 Preferred glass silk fabrics for insulating tape have weights per
unit area of roughly 25 g/cm² and roughly 33 g/cm². The lighter
fabric is formed by warp and woof threads from a yarn with a thread
weight of roughly 5.5 tex (mass in g per 1000 m thread length),
conversely the heavier fabric has woof threads of yarn with a
thread weight of roughly 5.5 tex and warp threads of a coarser yarn
with a thread weight of roughly 11 tex.

The tensile strength of the lighter fabric in the direction of the warp threads is roughly 70 N/cm, that of the heavier fabric, roughly 130 N/cm. In the manufacture of insulation the warp threads are pointed in the direction of winding. Since the heavier fabric has a higher tensile strength in the direction of winding than the lighter fabric, an insulating tape which contains the heavier fabric can be wound with a higher speed, without the tape tearing in doing so. In any case, due to the higher proportion by weight of fabric in the insulating tape the breakdown strength of the insulation is then less than the breakdown strength of insulation of equal thickness, made of an insulating tape which contains the lighter fabric.

Description of the Invention

Therefore the object is to devise an insulating tape of the initially mentioned type which has a low proportion of fabric and still is characterized by high tear resistance.

The insulating tape as claimed in the invention, due to the low proportion of fabric, is outstandingly well suited for producing dielectrically high quality insulations, thus as they were produced in the past from an insulating tape with a light glass fabric of fine yarn. Since the comparatively coarse yarn which is used in the insulating tape as claimed in the invention in the warp threads of the fabric has only a low thread density, the fabric portion of this tape can be kept essentially as great as that in the aforementioned insulating tape with light glass fabric. Moreover, the thickness of the coarser yarn used in the warp threads does not adversely affect the dielectric properties of the insulating tape as claimed in the invention or the insulation produced accordingly, since on the one hand the doubling of the thread weight causes only a thickening of the thread diameter by a factor of 1.4, and since on the other hand the thick threads flatten during winding due to

the low thread density.

In addition, the insulating tape as claimed in the invention is characterized mainly in that during winding it can be loaded like
5 an insulating tape which contains as the supporting body for the dielectrically high quality material a heavy fabric with warp threads of coarser yarn which have been plaited with a narrow mesh. This technical effect was undoubtedly surprising since the property of tensile strength of the insulating tape to be wound, which is
10 important in winding, in the insulating tape as claimed in the invention due to the small number of warp threads is not greater than in an insulating tape with fabric of the same weight and with a large number of warp threads of finer yarn. But it was ascertained that when wrapping an electrical conductor which generally has a rectangular or quadratic profile, not only the tensile strength is important, but mainly the edge tear initiation strength. The warp threads do not tear jointly during winding, but proceeding from one edge of the tape which has been laid down on the conductor, thread by thread. Therefore the strength of the individual warp threads is of special importance for the tear strength of the insulating tape. By using few, but relatively thick and thus tear-proof warp threads a fabric construction was achieved which meets the requirements for a light fabric which is resistant to initiation of edge tearing.

25 In addition, the insulating tape as claimed in the invention is made relatively coarsely meshed and is accordingly characterized by comparatively high porosity. This high porosity greatly facilitates and accelerates the impregnation of the wound
30 insulating tape with impregnation resin.

Advantageous developments of the insulating tape as claimed in the invention are given in the dependent claims.